fauna of the Mediterranean; there are besides, several ornithological papers by Oustalet and others.——*Zeitschrift für Wissenschaftliche Zoologie*, August 1, contains an elaborate memoir by H. Ludwig, on the embryology of a star fish, *Asteria gibbosa*. There is throughout the Echinodermata a mode of development, which must be spoken of as a metamorphosis, all the larvæ being ciliated, with a mouth and anus on one side. The processes by which the primary larva is converted into the echinoderm appear to be essentially the same in all cases; all that happens in a more complicated history, being the fact that in the secondary larvæ there is an absorption of those larval parts which had themselves become secondary. The secondary characters are not to be regarded as having anything to do with the future organization of the echinoderm, but as adaptations proper to the larval life, and disappearing at its close. There is no true solid morula in the earliest phases of development, but a blastosphere with a unilaminate wall; the gastrula is formed by invagination. Especial attention is given to the mode of origin of the hydrocœl, the blood vascular system and stomodæum, as well as the skeleton.

ENTOMOLOGY.[1]

A NEW RICE STALK-BORER: GENUS-GRINDING.—We quote the following from an article on a new Lepidopterous insect which, in the larva state, bores the stalks of rice. The article occurs in the annual report of the U. S. Entomologist for 1881-2, already printed:

"We have had some difficulty in deciding as to the true specific determination of this insect, chiefly because of a close general resemblance which it must possess to other species. Mr. Grote, when we showed him a specimen last autumn in New York, thought it might possibly be his *Chilo crambidoides*, while Professor Fernald determined it, from a specimen which we sent him, as *Diphryx prolatella* Grote,[2] stating at the time that he might be wrong, but that, having seen Mr. Grote's type, he considered our insect identical with it so far as he could trust his recollection. The specific description of *D. prolatella* certainly does agree very closely with the species we are considering, which has also the mucronate clypeus of Diphryx, but in order to refer our insect to *D. prolatella* we must assume that Mr. Grote erected his new genus, *Diphryx*, on a mutilated specimen which had lost its maxillary and part of its labial palpi, for the genus is founded on short labial papi which hardly exceed the face, and the absence of maxillary palpi—characters decidedly exceptional and remarkable in the family. In order to settle the matter, therefore, we again referred, through Mr. Henry Edwards, a perfect specimen

[1] This department is edited by Professor C. V. RILEY, Washington, D. C., to whom communications, books for notice, etc., should be sent.

[2] N. Am. Moths, Bull. U. S. Geol. Survey; VI, No. 2, p. 273.

to Mr. Grote, who upon this second more careful examination decides that it is neither of the species mentioned, but an undescribed species of Chilo."

Accepting Mr. Grote's decision, we described the insect as *Chilo oryzæellus*, but ventured the following opinion: "As Mr. Grote's types are in London he may be mistaken even in his final opinion, and the careless manner in which he has often made other genera renders it quite possible that Diphryx is a myth, founded on an imperfect specimen as above indicated."

In order to get positive information on the point in doubt, we subsequently mailed specimens of our *C. oryzæellus* to Lord Walsingham, with the request that he compare them with the type of *Diphryx prolatella*. His Lordship promptly replies by date of October 1, 1882: "I had no difficulty in finding this and ascertaining that you are completely justified in your conclusion that the Crambid No. 2557 [*C. oryzæellus*] is the same species. Grote's type is a female, and has the palpi (labial) broken off, the shorter maxillary palpi alone remaining."

It is apparent, therefore, that Mr. Grote not only founded the genus Diphryx on what has no existence in nature, but mistook, besides, the maxillary for labial palpi.

Effect of Pyrethrum upon the Heart-beat of Plusia brassicæ.—While engaged in experimenting for Professor Riley, with different samples of Pyrethrum, upon various lepidopterous larvæ, in September of the present year, I was much interested in noting the enormous increase in the rapidity of the pulse which the poisoning occasioned with the larvæ of the cabbage Plusia. These larvæ are so very delicate and transparent that the course of the vital fluid can be observed with ease, and repeated countings show the normal heart-beat to range between 44 and 68 per minute, averaging about 56. In the first convulsions from the effects of Pyrethrum the pulse immediately rose, and in the course of ten minutes reached from 150 to 164, and usually subsided in the next fifteen minutes to the neighborhood of 140. As the convulsions ceased the pulse fell but slightly, but became very weak, until, finally, it could be counted no longer. The last count before the heart ceased to beat, apparently through the paralyzing of its walls, showed a rate invariably of about 130 to the minute.—*L. O. Howard.*

A Butterfly Larva injurious to Pine Trees.—In the course of some remarks recently made by Dr. H. A. Hagen before the Entomological Society of Ontario, at its meeting in Montreal, he gave an interesting statement of the injury of *Pieris menapia* to pine forests in Washington Territory, and particularly in Colville valley, twelve miles from Spokan.

The caterpillar, found in all stages, destroys mostly the yellow

pine, but in some rare cases tamarack. The eggs are of the usual Pieris form and are laid in a series of a dozen or two in a straight line on the leaves. The caterpillar eats all the leaves except the fasicle at the end. Then all the tips turn upward and give to the tree a chandelier-like appearance. The larva comes down rom the tree on a thread, some fifty feet or more. In the middle of July near Spokan, a number of old males were found; higher up in the valley they grew more numerous, in some places many thousands being observed on one tree, presenting the appearance of snow flakes in the distance. The larva was found in all stages and the chrysalides were abundant.

On July 24th females and fresh males abounded. They paired at once and laid eggs the same day. The destruction seems to have been great but localized, and Mr. S. Henshaw and Mr. H. R. Stretch assisted Dr. Hagen in his observations.

The species has long been known to differ from the rest of its genus in its pine-feeding habits, and to be uncommonly numerous, at times, in various parts of the Rocky mountain region; but we have never heard of such disastrous consequences as those reported by Dr. Hagen.

ENTOMOLOGY IN WASHINGTON TERRITORY.—In following Dr. Hagen's remarks on the insects observed during the past summer in Washington Territory, Mr. S. Henshaw mentioned, at the late meeting of the Entomological Society of Ontario, some points of interest observed during the trip. Among the Hymenoptera, bees and wasps were very abundant, the forms of Odyneri being especially so; very few Multillidæ were found; the agricultural ant was observed in Montana.

Lepidoptera Rhopalocera were extremely abundant in specimens, but comparatively few species were observed.

Papilio machaon form *oregonia* occurred abundantly at Umatilla, Or., June 24th, and was also taken at several points in W. T., along the Yakima and Columbia rivers. Among the Heterocera, very few Sphingidæ occurred, five species of Ægeridæ were taken, and the most interesting Bombycid is a "basket-worm" (Thyridopteryx sp.?), found in Colville valley, W. T., and also in Montana. Cossus was very abundant on cotton-wood, and a number of interesting Notodontoid larvæ were taken. Night work yielded very poor results.

With the Diptera, Tabanidæ, Asilidæ, Bombyliidæ and Syrphidæ were most numerously represented. The occurrence of *Eristalis tenax* at Portland, Or. (common in Europe, and recorded in this country, first in 1875, from N. E. Geo. and Ill.), is of interest.

Two species of Omus (Dejeani and Audouini?) were common at Portland, Or., and the last named occurred at one locality east of the Cascade mountains in W. T. The distribution of Audouini (?) was confined to the mountain cañons, while Dejeani was equally common in such situations and along the river banks.

A number of Clivinæ and other Carabidæ usually found in moist situations, were taken in the driest parts of sand plains.

The most important discovery among the Orthoptera, is the capture of two specimens of Myrmecophila at Portland, Or. So far as known, there is but a single authentic record of the occurrence of the genus in this country.

A few species of Perlids were very abundant; a large series of two rare Gomphids were taken, and the occurrence of the genus Calopteryx on the banks of the Yakima, is of importance, as it is the first record of the genus west of the Rocky mountains, which were supposed to be a barrier to their western progress. As species occur far north, it is suggested that the passage is through the mountain passes beyond the limits of the United States.

A point of interest, and noticeable throughout W. T., is the late hour at which insects are on the wing. It was a matter of common occurrence to see Odonata belonging to the genera Aeschna, Libellula, Diplax, &c., hawking about from after sundown till dark. In New England and Europe, with the exception of a few species of Aeschna and Cordulia, none are seen on the wing later than the early afternoon.

THE ARMY-WORM IN 1882.—The damage to crops from the Army-worm in the more northern States, which we predicted in the June number of the NATURALIST, while not nearly so great as in 1880, has still been marked in certain localities, notably in Saratoga county, N. Y. The year 1882 will, however, be noted as a disastrous Army-worm year in many of the Southern States. Never before in the history of its appearances has the worm been so general south of Mason and Dixon's line. The first week in May it appeared in force in the northern counties of Alabama, and shortly afterwards in nearly all the southern counties of Tennessee. Later, alarming reports were received from Kentucky, North Carolina, Virginia and Maryland, and in June some fields of grain in the District of Columbia were badly damaged. The first week in August a correspondent in Avoyelles parish, La., sent us genuine northern Army-worms, with the report that they were greatly injuring the corn crop, but were not so numerous as they had been in May and June. Moreover, Dr. Chas. Mohr informs us that the hay crop around Mobile, Ala., was completely ruined by an army-worm which, from all accounts, seems to be the true *Leucania unipuncta.*

THE WHEAT-STALK WORM ON THE PACIFIC COAST.—Mr. J. A. Starner, of Dayton, Columbia county, Washington Territory, has recently sent us wheat-stalks containing larvæ which he states have caused a shortness of the crop for several years. An examination of the stalks showed many larvæ and pupæ seemingly identical with those of *Isosoma tritici* Riley, described in the March number of the NATURALIST, and working in a precisely

similar manner. From the great difference in locality, the presumption would be that the species would prove distinct, for *tritici* has never been found farther west than Washington county, Missouri. The rudimentary wing-pads of the pupæ, however, showed the western species to be wingless like *tritici*, and the imago, when it was subsequently bred, proved specifically identical.

We remember seeing, in 1879, a correspondence in the columns of the *Pacific Rural Press*, relative to a wheat-stalk worm which was doing some damage to the crop in California. Specimens were referred to Dr. Packard, who pronounced them in all respects similar to *Isosoma hordei*, the well-known joint-worm fly, except that they lacked wings, It seems quite probable that this insect was also *I. tritici.*

DESERVED HONOR.—We are glad to learn from a note in the June number of the (London) *Entomologist* that Miss Eleanor Ormerod has been appointed consulting entomologist to the Royal Agricultural Society, of Great Britain. We have had, on several occasions, the pleasure of referring to the excellency of Miss Ormerod's writings in economic entomology, which is beginning to be appreciated even in Great Britain.

IMPORTANT WORK ON CYNIPIDÆ.—Dr. Gustav Mayr has followed up his excellent paper on "Die Genera der gallenbewohnenden Cynipiden," by another, just published, entitled, "Die Europäischen Arten der gallenbewohnenden Cynipiden." In this latter paper 142 species of 22 genera are described by means of the synoptical tables which Dr. Mayr has adopted and uses altogether for this kind of work. From its completeness, and from its very practical form, this paper cannot but give an added impulse to the study of the Cynipidæ, both in Europe and in this country.

REMARKABLE FELTING CAUSED BY A BEETLE.—A few weeks ago we received from Mr. Henry Hales, of Ridgewood, N. J., a piece of pillow ticking, the inside of which was felted with a fur-like coating made from particles of the feathers with which the pillow had been filled. The felting is remarkably dense, evenly coating the whole surface of the piece of ticking, and greatly resembling in softness, smoothness and color the fur of a mole. We give Mr. Hales's own words:

"Enclosed I send you a piece of pillow-case which was filled with chicken feathers of various colors, in a neighbor's house. The pillow was noticed to gradually shrink, and when opened to ascertain the cause, it was found that a little beetle had bred and multiplied in the pillow, stripped all the soft parts of the feathers off the stems and felted the pillow-case inside with the feathers, making it one uniform color. The whole fabric, over a yard square, was all evenly covered as the enclosed piece which was cut from it. Do you know the insect? Is it an unusual occurrence?"

The insect is the common Dermestid beetle, *Attagenus megatoma*. An examination shows that the short, downy particles of feathers are all inserted by their basal ends, and the explanation of the felting is of course simple enough, when the barbed nature of these fine feathers is remembered, the barbs all directed towards the apex. In the regular shaking of the pillow, each of the minute particles of feather whenever caught in the cotton fabric by its base, became anchored in such way that every additional movement would anchor it firmer. The remarkable thing about the present case is that the felting should be so beautifully regular. We do not remember to have seen any published account of a similar felting resulting from the work of a beetle.—*C. V. Riley, in Rural New Yorker.*

Location of Taste in Insects.—J. Kunckel and J. Gazagnaire find that gustation in the Diptera begins with the paraglossæ, at the point at which the false tracheæ open, and is continued along the false tracheæ, becoming intensified at the extremity of the epipharynx, where quite a group of nerve-endings occurs; it is prolonged along the margins of the epipharynx and operates at the entrance or throughout the cavity of the pharynx.—*Journal of the Royal Microscopical Society.*

Vitality of Insects in Gases.—From the apparent indifference of some insects to foul and poisonous emanations as well as the varying sensitiveness of others under similar conditions, it would seem reasonable to conclude that there is a substantial difference in the delicacy of their respiratory functions, which might be indicated approximately by subjecting individuals of various groups to artificial atmospheres of deleterious or irrespirable gases.

This opens a wide field of experimentation both in the methods employed, the reagents used, and the insects examined. More from curiosity than any other motive, I have made some trials in this direction, and the results may at least be tabulated, though they have not been extended enough to admit of any very interesting deductions.

The vessels used in these experiments were large glass bottles, the mouths of which were fitted very tightly with rubber corks, these latter were perforated by two circular holes in which were secured a long and short glass tube made air-tight in their fittings by the pressure applied to the rubber cork upon insertion. These glass tubes were one-half inch in diameter, and served as an inlet and outlet for the gases, upon charging the bottles, and were in turn closed by small rubber corks.

The gases used were oxygen, hydrogen, carbonic oxide, carbonic acid anhydride, prussic acid vapors, nitrous acid fumes, chlorine, laughing gas (nitrous oxide) illuminating gas and ammonia. The experiments were made at the commencement of

the fall of 1881, and but a few species of insects, and those the most common were obtained for trial, and from want of time the experiments were necessarily incomplete.

Oxygen.—The insects introduced in this gas at first showed slight symptoms of exhilaration and excitement, moving rapidly, flying, accompanied with a restless inclination to jump; this passed away and the prisoners seemed totally unaffected by the excess of oxygen about them and when finally they succumbed, it seemed in some cases as much due to confinement as to the super-excitatory qualities of the gas they were breathing. Their resistance to the hurtful effects of the oxygen varied extremely, both in individuals of the same species and of different species, but in all cases the gas impaired their vitality only after long exposure to its influence.

Flies (*Musca domestica*) lived in the jars, completely charged with oxygen, from nine through fourteen, fifteen, twenty-three, to twenty-nine hours.

Colorado beetles (*Doryphora decemlineata*) were confined in oxygen for three days, and at the end of that time showed only a slight torpidity, which entirely disappeared when they were liberated, and they resumed their destructive habits apparently uninjured.

The larvæ of the Colorado beetle died in the oxygen after displaying great discomfort under its action after one and one-half day's exposure.

Meal bugs (*Upis pennsylvanicus*) were introduced into the oxygen with the Colorado beetles, and behaved in a similar manner though noticeably rendered more torpid and inert. They recovered completely upon their release. The common yellow butterfly (*Colias philodoce*) fluttered convulsively in the gas, but yielded to any injurious influence exerted by the gas over it, very slowly, dying in twelve hours, possibly as much from the effects of its own violence and consequent exhaustion, as from the power of the gas.

Moth (*Noctua*—) unexpectedly exhibited great vitality, living over one and one-half days.

Harvest men (*Phalangium dorsatum*) evinced considerable excitement in the oxygen, and lived twenty-four hours.

Hydrogen.—Flies (*Musca domestica*) were instantly knocked down and after a few struggles became quiescent, with complete paralysis and plication of legs, in fifteen to twenty minutes, or in some cases in five minutes. Though this prostration closely resembled death, and was so in many instances, yet some of the flies were actually alive for a long time afterwards. After twenty-four hours confinement one fly revived sufficiently to fly, though its legs remained crumpled beneath it.

Colorado beetles evinced a wonderful vitality in this suffocating atmosphere; the relation of two experiments will illustrate this.

In the first case a good-sized vigorous individual was dropped into the bottle, the vessel fully charged and the openings shut. The hostile atmosphere quickly affected the insect; after a few exertions to break its way out, it fell over, opening the elytræ and protruding its wing membranes, and although occasionally moving, it remained for a long time motionless. In an hour these movements were more noticeable. The beetle remained here for ten hours longer at the end of which time it was kicking, and after the least possible admission of air which failed to elicit any signs of relief from its fellow prisoners, commenced to walk. It was taken out in twenty-four hours, and revived so thoroughly as to appear actually unharmed.

In a second case several individuals apparently succumbed at once, but in twelve hours recovered partially and crawled around, and after remaining in the gas almost two days, were removed, and were active and lively. These were then introduced into an atmosphere of carbonic acid anhydride, in which they remained four hours, and then eventually recovered, when refreshed by air and food.

The snapper (*Elater communis*) displayed very inferior power of resistance to the noxious effects of the gas, reviving in one case, but feebly in twenty-four hours, and in another found dead in thirty hours.

Moths (*Noctua*--) died in twenty minutes, though instantly upon introduction, were thrown on their backs and paralyzed.

A black wasp (*Pompilus unifasciatus*) died in ten minutes.

Carbonic Acid Anhydride.--Flies (*Musca domestica*) were instantly overcome, and died in from ten to fifteen minutes.

A large blue fly, bluebottle fly (*Musca cæsar*) was in a dying state in two minutes, but revived completely upon its release.

Colorado beetles recovered after three hours exposure during which time they remained upon their backs almost motionless. The surprising vitality of those previously exposed to hydrogen has been given above.

Bed-bugs (*Cimex lectularius*) also recovered to a slight degree after two hours' exposure.

Carbonic Oxide.—Colorado beetles revived after remaining in this virulent atmosphere eight, twenty, thirty and forty-five minutes.

Ants (*Formica rubra*) died in thirty seconds and in one minute.

Prussic Acid Vapors.—This poisonous atmosphere acted fatally upon every insect exposed to it, though the indestructible Colorado beetle resisted its attacks more stubbornly than any other experimented with.

Nitrous Acid Fumes.—These fumes acted with fatal rapidity, and destroyed without perceptible distinctions in the time of their death the feebler and stronger insects.

Chlorine.—Chlorine corrodes and disintegrates the tissues, and

the insects exposed to a dense atmosphere of this gas were immediately killed. It was, therefore, used simply as a diluent of the ordinary air. The Colorado beetles lived in an atmosphere overpoweringly odorous of chlorine for one hour, and partially revived upon their release.

Nitrous Oxide (*laughing gas*)—The Colorado beetle gave in this gas no signs of exhilaration, lived two hours, and died upon removal; probably from exhaustion.

Young of the common grasshopper (*Caloptenus femur-rubrum*) were confined two hours in this gas and were but little affected.

Moths (*Noctua*) died in an hour and a-half.

Illuminating Gas.—The gases used were variable mixtures of hydrogen, marsh gas, carbonic oxide, and hydrocarbons, a notoriously dangerous and irrespirable compound.

Colorado beetles were instantly prostrated, folding up their legs underneath them, and gave in twenty minutes scarcely discernible indications of life. After an hour they were taken out and partially revived; some entirely recovered. The paralysis of the legs was the noticeable feature, especially that of the front pairs.

Croton bugs (*Ectobia germanica*) behaved similarly in the illuminating gases, and on being removed after half an hour's confinement recovered almost completely.

Young of grasshopper (*Caloptenus femur-rubrum*) evinced signs of life one hour after their introduction, and one individual taken out at that time appeared completely lifeless, yet recovered and was sufficiently strong to force its way out from under a beaker glass. Others left in one day were killed.

A cicada (*Cicada pruinosa*) died in ten minutes. Flies imprisoned in these gases, though they instantly fell to the bottom of the jars in an almost lifeless state, recovered after five minutes immersion on being removed. A longer imprisonment dispatched them.

It seems quite feasible that insect cases made air-tight could be charged from time to time with ordinary illuminating gas, and their contents thus protected against the inroads and devastations of Anthreni and Dermestes. Other objects could, of course, be so treated. The cases should be thoroughly tight, and the gas a pure and well-cleaned product. I have kept admirably some specimens in this way, but have noted several aberrant phenomena when specimens were moist. Some fragments of mummy skins, which I had in gas were in excellent condition after a long trial; they had been taken from a decomposing subject. On moistening them a rich growth of Fungi started out over them, which flourished in the atmosphere of gas for a short time, but after repeated charges sickened and died.

I am convinced that in place of ordinary illuminating gas the vapors of Prussic acid diluted with air or pure carbonic oxide, injected into tight insect boxes, will prove most efficacious for the protection of their contents.—*L. P. Gratacap.*